

Amendments to the Specification:

Under operation of the pump

Please replace paragraph [0118] with the following amended paragraph:

[0118] In FIG. 1B, arrows show fluid being drawn in through intake fitting 8 in housing member I into intake plenum zone 10, whereupon the fluid is forced ~~[[axially]]~~ radially outward by the diverging shape of the intake plenum 10 caused by rotor cone 13 and housing member 1. At this point, one would expect the flow to be converted from ~~[[radial]]~~ axial to ~~[[axial]]~~ radial, except that the motion of vanes 7, shown in FIG. 1A, is circular, and the passing of the vane 7 in the cylinder of revolution described by the ~~[[axially]]~~ radially inner vane 7 tips as a boundary 11 to plenum 10, creates a whirlpool effect, causing the flow direction to change from ~~[[axially]]~~ radially outward to more of a tangential direction with respect to the cylinder of revolution boundary of the intake plenum 10 caused by the vane 7 motion. This tangential direction may be enhanced by spiral vane guides 22 on intake fitting 8 shown in FIG. 1C and FIG. 1D, such that the intake flow is given a spiral, hence tangential component, driven by atmospheric pressure in the form of net positive suction head. Alternately, the tangential intake flow may be aided by radial vanes 14 on rotor cone 13 as shown in FIG. 2B. However, it is more efficient to let atmospheric pressure be the engine driving the fluid toward a tangential intake into the channels between vans 15, than using the driven energy from the rotor.

Please replace paragraph [0120] with following paragraph:

[0120] Then as the chambers are filled primarily by the momentum of the fluid, and since the angle on the vanes 7 increases from tangential at the fluid entrance to channel 15 to more radial at the ~~[[axially]]~~ radially outer vanes position at 19, the

vanes have little direct contact with the fluid since although the vane is traveling faster than the fluid, it is also angled back starting at zero angle and increasing to about 60 ~~[[degree]]~~ degrees in FIG. 1A. As the fluid enters the channels 15, it begins to gain further rotational energy from containment by the vanes 7, and at the same time the fluid loses all radial velocity, unlike with centrifugal pumps.

Please replace paragraph [0121] with the following paragraph:

[0121] As the fluid loses all the radial velocity and is captured by the vanes 7 and the housing 1 chamber wall, it is also captured on the ~~[[axially]]~~ radially inner surface by an isobar 16 shown by a phantom line. It is captured by the divergent force field of centrifugal force, much as a full bucket of water is contained by the convergent force field of the earth's gravity. Since the fluid is totally contained by the chamber 17 it is at rest with respect to the rotor and only has rotational velocity. As such, the pump becomes positive displacement by definition, since the fluid is contained, then displaced. This is quite similar to the displacement in an external gear pump, which is not acting against a pressure head. The contained fluid is then carried by the rotor around the cylindrical chamber wall in housing element 1 to where it is ejected by its own momentum through tangential discharge 18. Unlike centrifugal pumps, the fluid, which, is contained in the enclosed chambers 17, develops a pressure gradient due to centrifugal force, which is low at the radially inner portion of chamber 15 but high near the radially outer cylindrical wall of the chamber of housing element 1. As the enclosed chamber passes the rotary valve tangential discharge port 18, the pressure is relieved and converted into velocity. Just prior to crossing the tangential discharge port, the fluid has rotational momentum, but also, being in an enclosed rotating chamber, it has pressure due to centrifugal force. The fluid, which is contained, is at rest with respect to the rotor. But as the chamber begins to pass the port 18, it begins to lose pressure, and to gain velocity. The chamber resembles a tank with a spigot at the bottom, which is opened and a stream with velocity comes from the spigot. Then if the tank is traveling at rotor velocity, and the spigot is aimed

toward the direction of motion, the velocity of the fluid will be the rotor velocity plus the spigot velocity, resulting in a very high tangential discharge velocity.

Please replace paragraph [0129] with the following paragraph:

[0129] FIG. 5C shows the same plan view of the pump, but shows it as a motor, the fluid enters the pump in the same manner as in 5B, except the entering fluid is high pressure fluid having high velocity. Again, the fluid is acted on by a volute to send it into a circular whirlpool at 20 into intake plenum 10 tangentially, but at high velocity, where it enters the passage between vanes. Multiple tangential intake ducts may be used to advantage. However, as a motor, the vane shape should be similar to the shape 21 shown in FIG. 5E. Note that as a motor, the vane configuration is more resembling that of a centrifugal pump. The fluid enters the passage channels 15 at an angle, which is not exactly tangential, but leaves the pump housing member 1 tangentially. With the motor vanes 19, the fluid is leaving the intake plenum 10 tangentially but at the stopped rotor position sees the channel passage 15 as at head pressure. But as the rotor begins to turn by tangential jet action, the apparent angle between the intake flow and the vane begins to change from initially a reverse direction acute angle, toward a 90-degree angle. While this is happening, the rotor is increasing in speed and the pressure is changing to velocity and as the rotor reaches speed the fluid at intake plenum 10 is at lower pressure, but high rotational velocity. As the fluid leaves intake plenum tangentially, it acts against the motor vanes 19 such as to cause the rotor to rotate and provide torque. The momentum of the fluid is, slowed by vanes 19, both in the ~~[[axially]]~~ radially outward direction and tangentially, such that it may leave the rotor into discharge port 18 tangentially with a high velocity with respect to the vane tips, but with little or no ground speed. In this way it is acting in a similar manner to the propeller type hydro turbines where the fluid acts directly against a blade. While the propeller is working in an axial direction, this device works in both a radial and tangential direction. The discharge, although tangential, can also be 360 degrees as shown in FIG. 5D, which means that as a motor, the fluid is not captured as it was in the previous pump embodiments, but

the fluid is always in continual motion with respect to the rotor and the channel 15 between vanes and there is no captured volume 17. At start up, with the rotor at zero velocity, pressure forms in the intake plenum 10 and the fluid has to be ejected through the fluid passages 15 which provides, torque by thrust exerted on the rotor. At this point of operation, the torque is quite high, but the power is low due to no rotational speed. As the rotor gains rotational velocity, the manner in which the torque is generated changes from jet reaction to force against a rotor member and in this way is similar to both the Pelton wheel and the axial propeller motor. The difference between this and a Pelton wheel is that this concept allows a high flow rate as well as a high specific speed. The rotor speed, which is a result of velocity from the head pressure of $V^2 = 2gH$ is quite high since the fluid is entering nearer to the axis of rotation. This means the fluid velocity within the channel passages 15 is high with respect to the rotor, but the fluid velocity with respect to the earth is slowed to near zero by the vanes, this slowing causing torque to the rotor. This is in some ways opposite to a Francis reaction turbine, where the fluid enters the rotor channels as tangentially as possible and is discharged axially, the torque being provided by the change in angular momentum from high momentum to low momentum.

Please replace paragraph [0133]

[0133] FIG. 6B is a side view showing many of the same parts with the same functions as previously discussed. The arrows show the path of the fluid through the pump. This is a very high power device, suitable for liquid jet propulsion. If this pump is positioned in a boat such that there are intake ducts through the bottom of the vessel with the ducts going aft into the pump intakes 20 and the discharge ducts 18 turned to exit aft of the vessel, thrust will be obtained. An advantage of this type of marine drive is that the fluid momentum increases as the cube of the rpm and experiment shows it may be more than the cube. This is of considerable advantage to a high speed, [[planning]] planing vessel, since the vessel engine at high rpm will be delivering high power to the fluid, due to the exponential relationship of the rpm vs.

torque curve. In an axial turbine, the torque is linear, and due to the intake speed, very little power is delivered to the fluid even through the engine is racing. In this design, full power can be delivered. FIG. 6A can also be a motor, provided the intake ducts are smaller compared to discharge, and if the FIG. 5D type rotor is used.